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Review of the genus *Aristelix* Nixon, 1943 (Hymenoptera, Braconidae, Alysiinae), with description of a new species from Iran and clarification of the status of *Antrusa chrysogastra* (Tobias, 1986)

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Abstract

The species of the Western Palaearctic genus *Aristelix* Nixon, 1943 are reviewed. The new species *Aristelix persica* **sp. n.** is described from Iran. Redescriptions and illustrations of *A. phaenicura* (Haliday, 1839) and *Antrusa chrysogastra* (Tobias, 1986), **comb. n.** are presented. A key to the known *Aristelix* species is provided.

Keywords

Braconidae, Alysiinae, Dacnusini, parasitoids, *Antrusa*, new species, new combination, redescriptions, Iran

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Introduction

Aristelix Nixon, 1943 is a rare, previously monotypic genus of the tribe Dacnusini (Nixon 1943, Shenefelt 1974, Tobias 1998). The genus is restricted exclusively to the Western Palaearctic region (Tobias 1986, Yu et al. 2012) and initially included only the type species, *A. phaenicura* (Haliday, 1839), relatively widely distributed in several European countries (Yu et al. 2012).

The main diagnostic characters of *Aristelix* are as follows: at least mesosoma, but sometimes also temple, hind coxa and femur granulate; mandibles short, always with four distinct teeth, its median (second) tooth the longest; metasoma elongate, apical metasomal tergites usually with more than one row of setae; second metasomal tergite rugose-striate at least in basal half; radial (r) vein originating distinctly before middle of pterostigma (Tobias 1986, Achterberg 1993).

Exotela (*Antrusa*) *chrysogastra* Tobias, 1986, described from Moldova by Tobias (1986) (at this time treated regarded *Antrusa* Nixon, 1943 as a subgenus of *Exotela* Foerster, 1862), was also transferred to the genus *Aristelix* by Fischer (1990). However, examination of the holotype of this species showed that it is not member of *Aristelix* because it lacks all the main diagnostic characters of this genus, listed above. Actually this species belongs to the genus *Antrusa* Nixon due to vein 2-M merging with the submarginal cell, as opposed to the discal cell in *Exotela* Forster, 1862 (Tobias 1998; Pardo 2010). *Antrusa* comprises a total of 36 species described from the Palaeartic Region (Yu et al. 2012) and it is characterized by the apical metasomal tergites each with only one row of setae, mandible 3-dentate, middle longitudinal ridge on the first metasomal tergite developed, and vein m-cu antefurcal (Tobias 1986, 1998; Pardo 2010). Keys for identification of all genera discussed here were published by Tobias (1998), Perepechaenko (2000) and Pardo (2010).

According to Tobias (1998), *Orientelix* Tobias, 1998 (type species *O. marginalis* Tobias, 1998), recently described from the Russian Far East genus , is closely related to *Aristelix* due to the similar mandible structure, elongate mesosoma and sculpture of the second tergite. We suppose it is a geographical vicariant of the genus *Aristelix* in the Eastern Palaearctic.

In this work, we describe a peculiar new species of *Aristelix* from Iran, as well as redescribe and illustrate the type species, and provide a key for determination of these two species. Additionally, *Antrusa chrysogastra* (Tobias, 1986) is redescribed and its taxonomic position redefined.

Materials and methods

Two specimens of *Aristelix* were collected using Malaise traps in the single locality of Hormozgan Province of Iran (Fig. 1), where more than 70% of territory is covered by mountains and hills (Zaeifi 2001).

Figure 1. Habitats in Hormozgan Province, where *Aristelix* specimens were collected. **A** General landscape **B** Malaise trap habitat.

Photographs were taken with a Digital Microscope VHX-2000 and with a Nikon® D700 mounted on a Leica® S8APO microscope, with images combined using Helicon Focus® and edited using Adobe Photoshop® imaging system. For terminology of morphological features and sculpture, measurements and wing venation nomenclature see van Achterberg (1993) and HymAO (Hymenoptera Anatomy Ontology Portal: http://portal.hymao.org/) (Yoder et al. 2010).

The types of new species are deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia (ZISP).

Taxonomic part

***Aristelix phaenicura* (Haliday, 1839)**
Figs 2, 3

Alysia (*Dacnusa*) *phaenicura* Haliday 1839: 6.
Alysia (*Dacnusa*) *phoenicura*: Haliday 1839: 27, 66, Dalla Torre 1898: 28 (mispelling: Haliday spelt the species as phaenicura in the description but as phoenicura in the index).
Dacnusa phaenicura: Nixon 1937: 49.
Dacnusa phoenicura: Marshall 1895: 463, 1897: 2, Szépligeti 1904: 195, Telenga 1935: 119.
Aristelix phaenicura: Nixon 1943: 27, Shenefelt 1974: 1030, Riegel 1982: 61, Tobias 1986: 269, Docavo and Tormos 1988: 162, Quicke et al. 1997: 26, Fischer 1999: 17, Belokobylskij et al. 2003: 357, Papp 2004: 133, 2005: 145, Yu et al. 2012.
Aristelix phoenicura: van Achterberg 1997: 65, Perepechayenko 2008: 365, Broad et al. 2012: 13.

Material examined. 1 female, Moldova, Tatareshty, steppe meadow in the forest, 6.vi.1967 (Tobias coll.), 1 male, Russia, Sochi, Lazarevskoe, terraced slope, forest, 8–9.v.1975 (Tobias coll.)

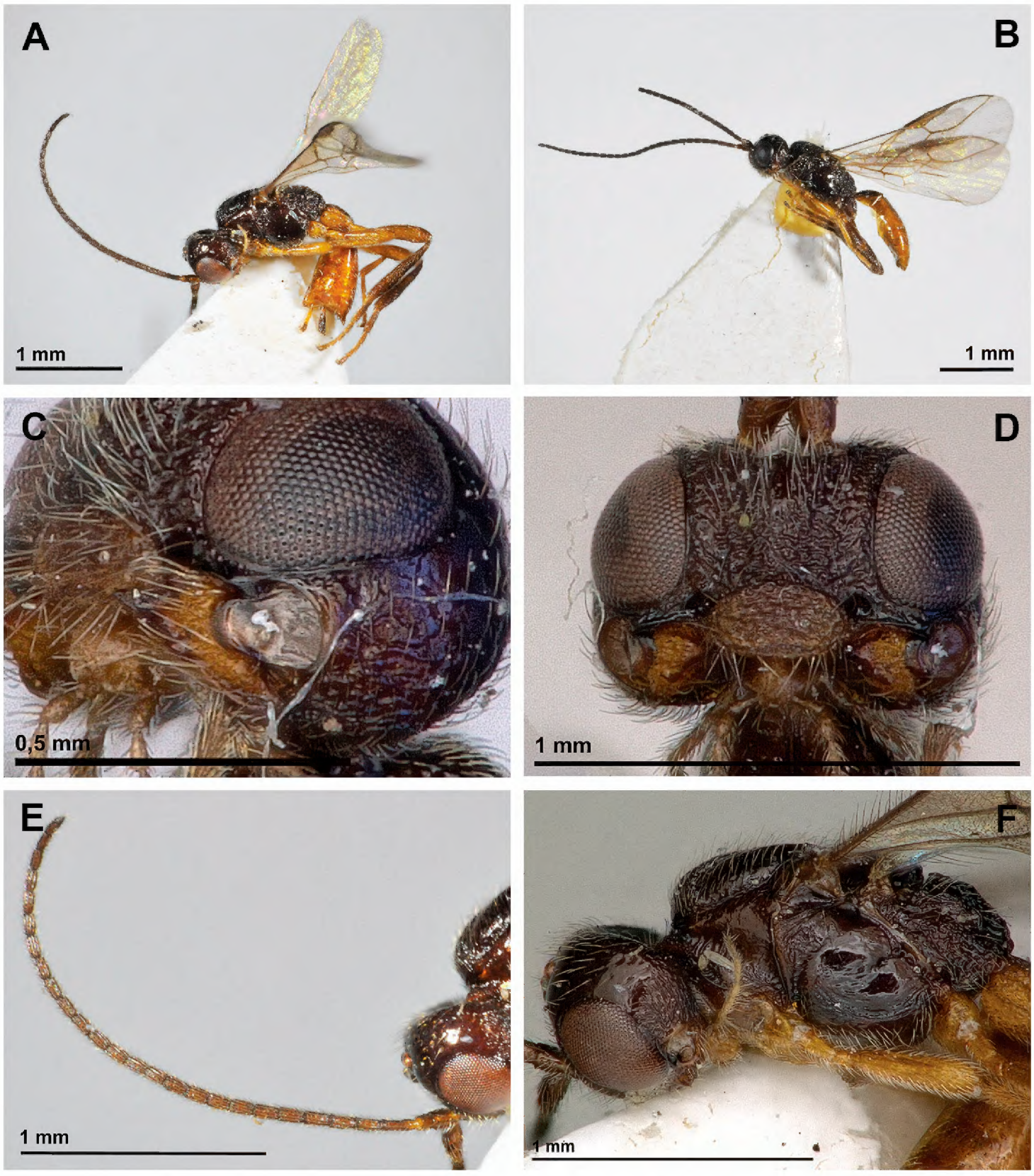

Figure 2. *Aristelix phaenicura* (Haliday) (**A, C–F** female **B** male) **A, B** Habitus, lateral view **C** Mandible **D** Head, front view **E** Antenna **F** Head and mesosoma, lateral view.

Redescription. Female. Body length 2.6 mm; fore wing length 2.6 mm.

Head in dorsal view 1.7 times as wide as median length, 1.45 times as wide as mesoscutum, vertex smooth, with small groove between occiput and ocelli. Eye in lateral view 1.5 times as high as wide and 1.2 times as wide as temple medially. POL 1.4 times OD; OOL 2.6 times OD. Face punctate, with scattered short setae, 1.4 times as wide as high; inner margins of eyes subparallel. Clypeus slightly curved ventrally, 1.9 times as wide as high. Mandible 4-dentate, not widened towards apex, 1.1 times as long as maximum width. Upper tooth of mandible small, distinctly shorter than lower

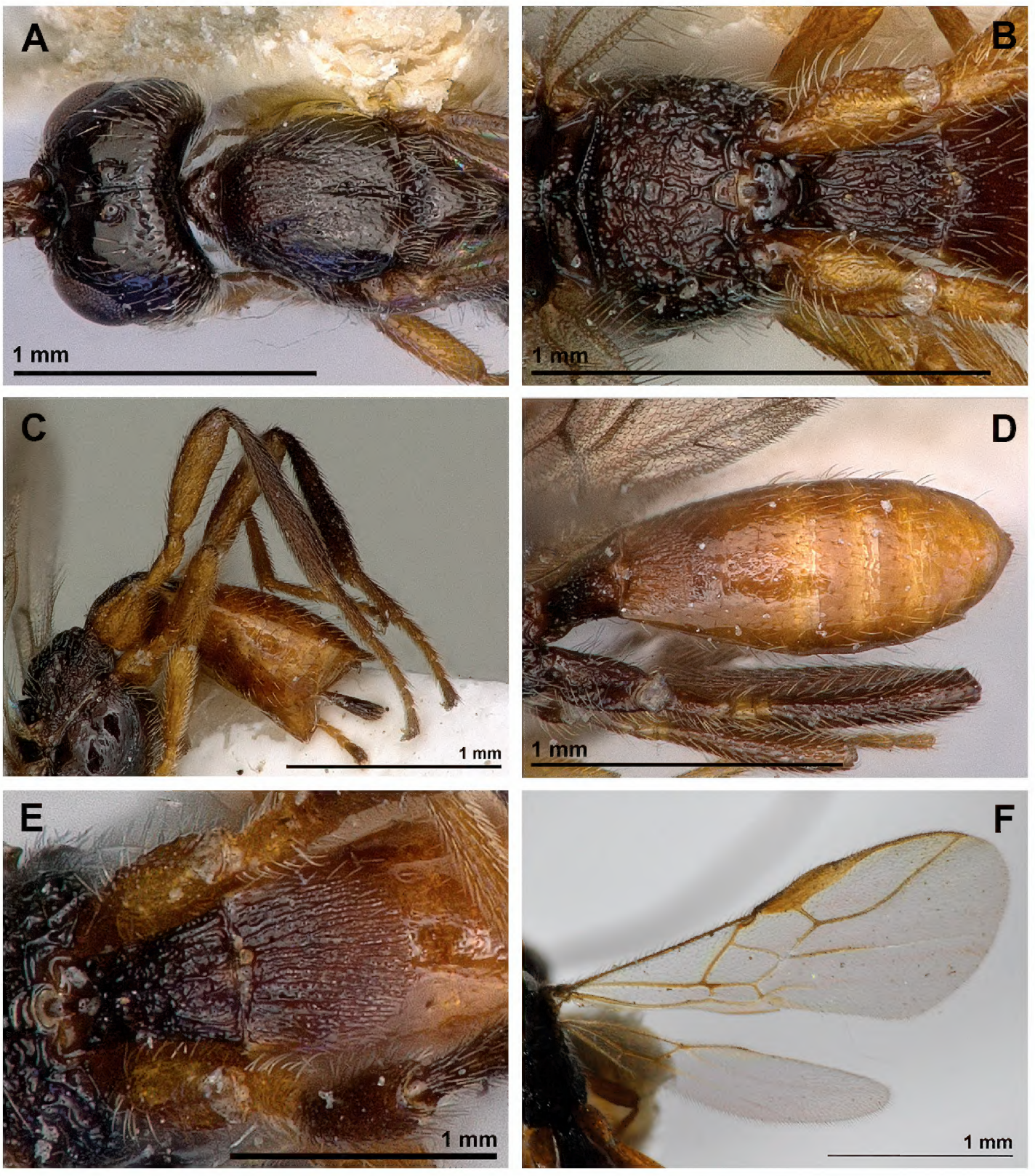

Figure 3. *Aristelix phaenicura* (Haliday) (female) **A** Head and mesonotum, dorsal view **B** Propodeum and first metasomal tergite, dorsal view **C** Legs, metasoma and ovipositor, lateral view **D** Metasoma, dorsal view **E** First to third metasomal tergites, dorsal view **F** Fore and hind wings.

tooth, pointed apically; second (median) tooth longest, wide basally and distinctly narrowed towards apex, pointed apically; third tooth small, about as long as first tooth, pointed, arising from base of second tooth and situated above it; lower tooth rather large, pointed apically, distinctly separated.

Antenna longer than body, 27-segmented. Scape twice as long as pedicel. First flagellar segment 3.2 times as long as its apical width, 1.25 times as long as first segment; second segment 2.5 times as long as its maximum width. Penultimate segment 2.2–2.3 times as long as wide; apical segment 3.0 times as long as maximum width.

Mesosoma 1.7 times as long as high (lateral view). Mesoscutum 0.95 times as long as its maximum width, with numerous scattered setae. Notauli shallow on posterior half of mesoscutum. Mesoscutal midpit present, distinctly elongate. Prescutellar depression smooth, with median carina but without lateral carinae. Precoxal suture present, weakly rugulose, reaching anterior and posterior margins of mesopleuron. Mesepimeral sulcus crenulate below. Lower part of mesopleuron and metapleuron with long whitish setae. Propodeum completely rugose-reticulate. Propodeal spiracle relatively small.

Wings. Length of fore wing 2.6 times its maximum width. Marginal cell short, ending before apex of wing, 3.7 times as long as its maximum width. Vein r arising distinctly before middle of pterostigma. Second submarginal cell closed, 2.5 times as long as its maximum width. Hind wing 5.3 times as long as maximum width.

Legs. Hind femur 3.5 times as long as maximum width. Hind tibia distinctly widened towards apex, 7.9 times as long as its maximum subapical width, 1.05 times as long as hind tarsus. First segment of hind tarsus (basitarsus) 1.25 times as long as second segment.

Metasoma compressed. First tergite striate, with scattered setae, weakly widened towards apex, twice as long as apical width. Second tergite mainly striate, smooth on apical sides. Tergites from third to sixth with more them one row of setae. Ovipositor weakly projecting beyond apex of metasoma, 0.85 times as long as first tergite, 0.5 times as long as hind femur.

Colour. Head, antenna, mesosoma, hind tibia, first segment of hind tarsus and ovipositor sheaths dark brown. Legs brownish yellow. First and second metasomal tergite almost black, following tergites yellowish brown. Wings hyaline. Pterostigma brown.

Male. Body length 2.7 mm; fore wing 2.7 mm. Antenna 29-segmented. First flagellar segment 2.2 times and second segment twice as long as their maximum width. Hind femur 3.8 times as long as maximum width. All coxae, hind femur and tibia dark brown. Otherwise similar to female.

Comparative diagnosis. Differences between *Aristelix phaenicura* and *A. persica* sp. n. are described in the key below.

Distribution. Belgium, Germany, Hungary, Ireland, Moldova, Russia, Slovakia, Spain, Ukraine, United Kingdom (Yu et al. 2012).

Aristelix persica Peris-Felipo, sp. n.

http://zoobank.org/3B3E17D6-AD40-4B9E-B58F-6CECC961BFCB

Figs 4, 5

Type material. Holotype: female, Iran, Hormozgan Province, Geno, 27°24'16.16"N, 56°08'51.80"E, 1274 m, 20.iii.2012 (Ameri leg.) (ZISP). Paratype: 1 male, same label as holotype (ZISP).

Description. Female. Body length 2.8 mm, fore wing length 2.5 mm.

Head in dorsal view 1.4 times as wide as median length, 1.3 times as wide as mesoscutum; vertex smooth, with dark line between occiput and ocelli. Eye in lateral view

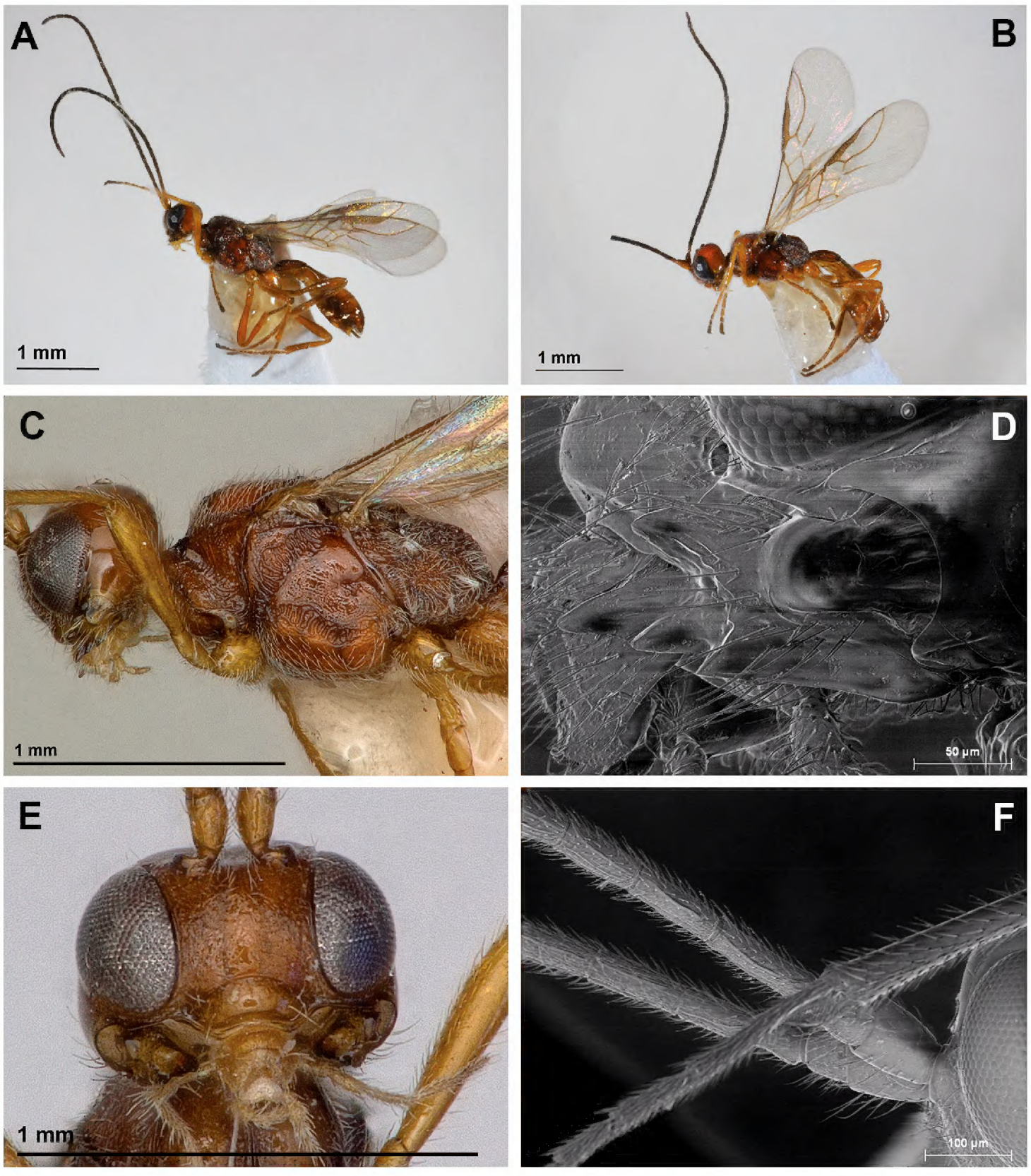

Figure 4. *Aristelix persica* sp. n. (**A, C–F** female **B** male) **A, B** Habitus, lateral view **C** Head and mesosoma, lateral view **D** Mandible **E** Head, front view **F** Basal segments of antenna.

1.5 times as high as wide and as wide as temple medially. POL 1.4 times OD; OOL 2.8 times OD. Face smooth, with scattered short setae, 1.65 times as wide as high; inner margins of eyes subparallel. Clypeus slightly curved ventrally, twice as wide as high. Anterior tentorial pit short, not reached middle half distance between clypeus and eye. Mandible 4-dentate, not widened towards apex, 1.2 times as long as maximum width. Upper tooth of mandible rather wide, longer than lower tooth, pointed apically; second (median) tooth longest, wide basally and distinctly narrowed towards apex, subpointed apically; third tooth about as long as first tooth, pointed, arising

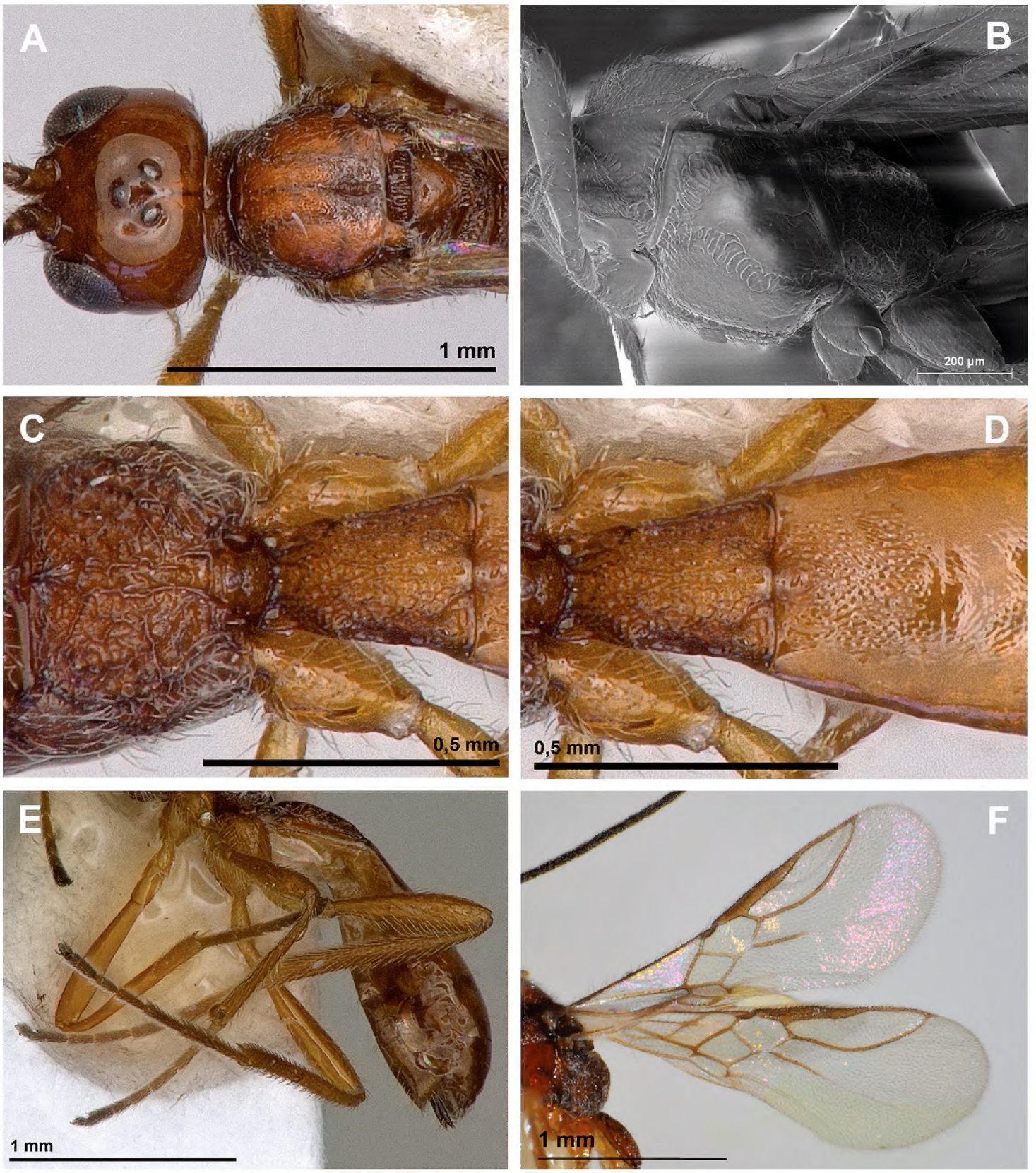

Figure 5. *Aristelix persica* sp. n. (female) **A** Head and mesonotum, dorsal view **B** Mesosoma, lateral view **C** Propodeum and first metasomal tergite, dorsal view **D** First and second metasomal tergites, dorsal view **E** Legs, metasoma and ovipositor, lateral view **F** Fore and hind wings.

from base of second tooth and situated upper it; lower tooth shortest, pointed apically, distinctly separated.

Antenna longer than body, 26-segmented. Scape twice as long as pedicel. First flagellar segment 3.9 times as long as its apical width, 1.3 times as long as first segment; second segment 3.2 times as long as its maximum width. Penultimate segment about 2.2 times and apical segment 3.0 times as long as their maximum width accordingly.

Mesosoma 1.4 times as long as high (lateral view). Mesoscutum 0.95 times as long as its maximum width, with numerous scattered setae. Notauli shallow on posterior half of mesoscutum. Mesoscutal midpit present, distinctly elongate. Prescutellar depression smooth, with median and lateral carinae. Precoxal suture present, wide and coarsely crenulate, reaching anterior and posterior margins of mesopleuron. Mesepimeral sulcus crenulate below. Lower part of mesopleuron and metapleuron with long whitish setae. Propodeum completely rugose-reticulate. Propodeal spiracle relatively small.

Wings. Length of fore wing 2.8 times its maximum width. Marginal cell short, ending before apex of wing, 3.5 times as long as its maximum width. Vein r arising distinctly before middle of pterostigma. Second submarginal cell closed, 2.8 times as long as its maximum width. Hind wing 5.6 times as long as maximum width.

Legs. Hind femur 4.15 times as long as maximum width. Hind tibia weakly widened towards apex, 10.8 times as long as its maximum subapical width, 0.9 times as long as hind tarsus. First segment of hind tarsus (basitarsus) 1.6 times as long as second segment.

Metasoma compressed laterally. First tergite striate; weakly widened towards apex; 1.7 times as long as apical width; with scattered setae. Second tergite almost completely longitudinally rugose-punctate. Tergites third to sixth with only one row of setae on their apical halves. Ovipositor not projecting beyond apex of metasoma, 0.35 times as long as first tergite, 0.25 times as long as hind femur.

Colour. Body mainly light reddish brown and partly darker reddish. Antenna mainly, mesosoma in lateral furrows and depressions, tracks of notauli, prescutellar depression, propodeum, metapleuron and apical tergites of metasoma dark brown. Basal segments of antenna and legs yellowish brown, hind leg darkened. Wings hyaline. Pterostigma brown.

Male. Body length 2.5 mm; fore wing 2.4 mm. Antenna 26-segmented. First flagellar segment 4.2 times as long as its maximum width; second segment 3.0 times as long as its maximum width. Otherwise similar to female.

Etymology. The name refers to the historical name of the country, Persia, where this new species was discovered.

Comparative diagnosis. Differences between *Aristelix persica* sp. n. and *A. phaenicura* (Haliday) are described in the following key.

Key to species of the genus *Aristelix*

1 Hind tibia dark (Fig. 3C, D). Precoxal suture finely rugulose (Fig. 2F). Eye in lateral view 1.5 times as wide as temple medially (Fig. 2F). Basal half of temple punctate (Fig. 2C, F). First flagellar segment 3.2 times as long as its maximum width (Fig. 2E). Mesosoma in lateral view 1.7 times as long as high (Fig. 2F). Hind femur 3.5–3.8 times as long as maximum width (Fig. 3C). First metasomal tergite 2.0 times as long as apical width (Figs 3B, 3E). ..... ***A. phaenicura*** (Haliday)

– Hind tibia light reddish brown (Fig. 5E). Precoxal suture coarsely crenulate (Figs 4C, 5B). Eye in lateral view as wide as temple medially (Fig. 4C). Basal half of temple smooth (Fig. 4C). First flagellar segment 3.9 times as long as its maximum width (Fig. 4F). Mesosoma in lateral view 1.4 times as long as high (Figs 4C, 5B). Hind femur 4.1–4.2 times as long as maximum width (Fig. 5E). First metasomal tergite 1.7 times as long as apical width (Figs 5C, 5D)..... ***A. persica* sp. n.**

***Antrusa chrysogastra* (Tobias, 1986), comb. n.**
Figs 6, 7

Exotela (*Antrusa*) *chrysogastra* Tobias 1986: 351.
Antrusa chrysogastra: Perepechaenko 2000: 75; Tormos et al. 2009: 258.
Aristelix chrysogastra: Fischer 1999: 17; Yu et al. 2012.

Material examined. Holotype (ZISP; examined): male, Moldova (Moldavia) "Tatareshty [47°12'15.8"N, 28°32'19.0"E], ostepn[yonnyi] lug v lesu [= steppe meadow in the forest], Tobias [collector], 6.vi.[1]967"; "Holotypus *Exotela* (*Antrusa*) *chrysogastra* Tobias".

Redescription. Male. Body length 2.5 mm; fore wing length 2.85 mm.

Head in dorsal view twice as wide as median length, 1.3 times as wide as mesoscutum, vertex entirely smooth, with scattered setae. Eye in lateral view 1.5 times as high as wide and 1.2 times as wide as temple medially. POL 1.85 times OD; OOL 3.0 times OD. Face punctate, with middle carina in upper half, with scattered long setae, twice as wide as high; inner margins of eyes subparallel. Clypeus slightly curved ventrally, 2.9 times as wide as high. Mandible 3-dentate, widened towards apex, 1.25 times as long as maximum width. Upper tooth of mandible longer than lower tooth, rounded apically; middle tooth long, wide basally and narrowed towards apex, rounded apically; lower tooth pointed apically.

Antenna longer than body, 29-segmented. Scape about 1.7 times as long as pedicel. First flagellar segment 2.6 times as long as its apical width, 1.25 times as long as first segment; second segment 2.15 times as long as its maximum width. Penultimate segments 1.3 times as long as wide; apical segment 2.3 times as long as maximum width.

Mesosoma 1.25 times as long as high (lateral view). Mesoscutum as long as its maximum width, with numerous setae on its middle surface and scattered setae on lateral areas. Notauli shallow on horizontal surface of mesoscutum. Mesoscutal midpit present, distinctly elongate. Prescutellar depression smooth, with median and lateral carinae. Precoxal suture present, wide, rugose, reached anterior margin of mesopleuron and not reaching its posterior margin. Mesepimeral sulcus crenulate below. Lower part of mesopleuron and metapleuron with long whitish setae. Propodeum completely rugose-reticulate. Propodeal spiracle relatively small.

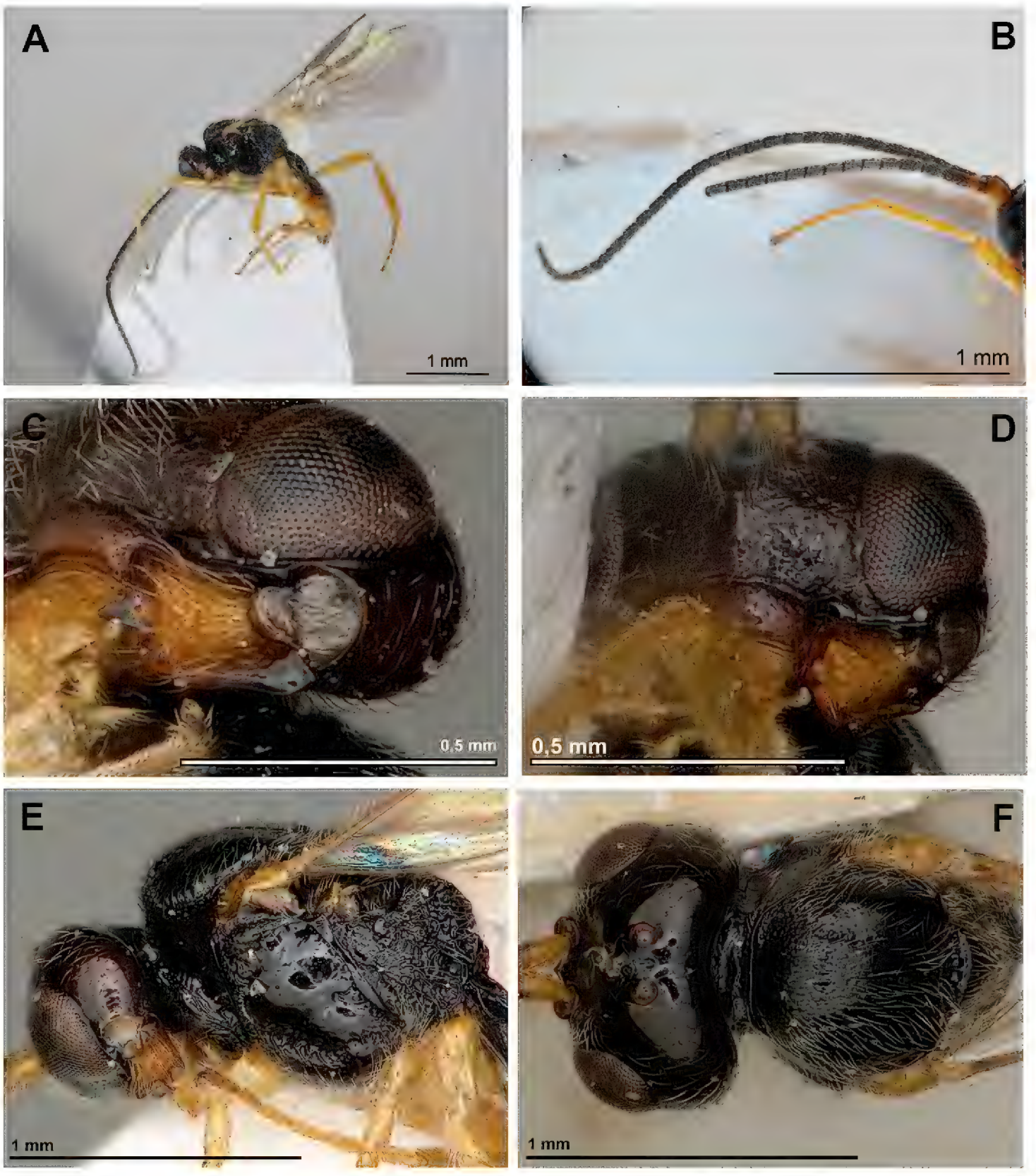

Figure 6. *Antrusa chrysogastra* (Tobias) (male) **A** Habitus, lateral view **B** Antenna **C** Mandible **D** Head, front view **E** Head and mesosoma, lateral view **F** Head and mesonotum, dorsal view.

Wings. Length of fore wing 3.0 times its maximum width. Marginal cell short, ending before apex of wing, 3.5 times as long as its maximum width. Vein r arising distinctly before middle of pterostigma. Second submarginal cell closed, 2.2 times as long as its maximum width. Hind wing 5.0 times as long as maximum width.

Legs. Hind femur 4.0 times as long as maximum width. Hind tibia weakly widened towards apex, 10.0 times as long as its maximum subapical width, 1.25 times as long as hind tarsus. First segment of hind tarsus (basitarsus) 1.7 times as long as second segment.

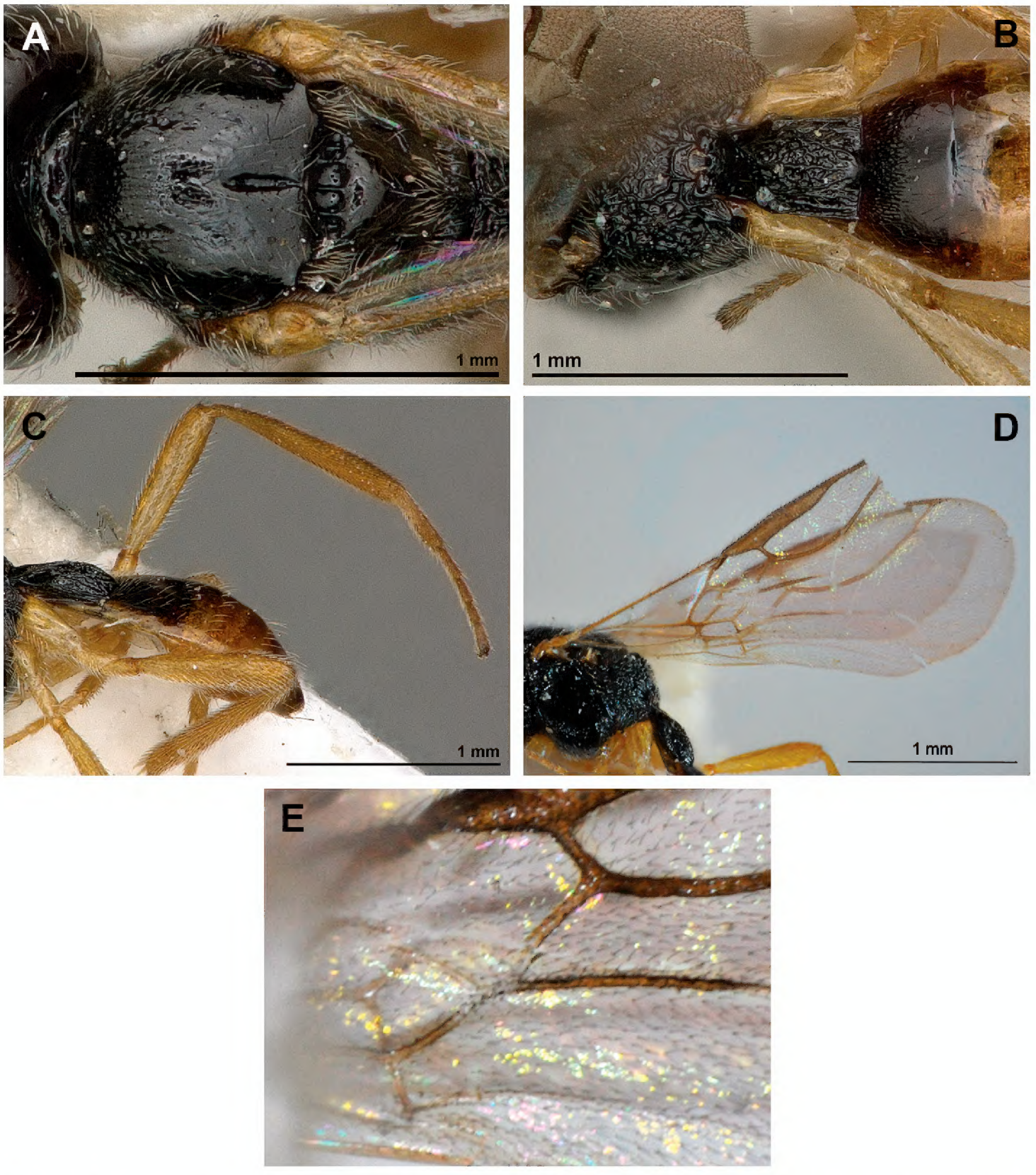

Figure 7. *Antrusa chrysogastra* (Tobias) (male) **A** Mesosoma, dorsal view **B** Propodeum and first to third metasoma tergites, dorsal view **C** Hind leg and metasoma, lateral view **D** Fore wing **E** Median part of fore wing.

Metasoma distinctly compressed. First tergite entirely striate, with scattered setae, weakly widened towards apex, 1.5 times as long as apical width. Second tergite striate in apical half and here with scattered setae, 0.4 times as long medially as basal its width. Fourth to sixth tergites each with single row of setae in apical half.

Colour. Head, antennal segments, mesosoma, first and second tergite black. Scape, pedicel and most part of metasoma yellowish brown, first and second metasomal tergites black. Legs yellow. Wings hyaline. Pterostigma brown.

Female. Unknown.

Comparative diagnosis. According to Tobias' key (1986), *Antrusa chrysogastra* (Tobias) differs from *A. chrysotegula* (Tobias, 1986) in having the first metasomal tergite rugose-punctate (longitudinally striate in *A. chrysotegula*), hind femur 4.5 times as long as its maximum width (5.5 times in *A. chrysotegula*), mesonotum almost entirely with short semi-erecte setae (only anteriorly pubescent in *A. chrysotegula*), and metasoma yellow in the apical half (dark to black in apical half in *A. chrysotegula*).

Distribution. Moldova.

Remarks. The main characters of *Antrusa* Förster are vein 2-M usually merging with the submarginal cell; m-cu antefurcal; mandibles widened apically and with only three teeth; first metasomal tergite with a median longitudinal keel; metasoma and head without granulate sculpture; second metasomal tergite usually smooth; apical metasomal tergites each with a single transverse line of setae; and no sexual dimorphism in the pterostigma (Tobias 1986, van Achterberg 1993, Perepechaenko 2000, Tormos et al. 2009, Pardo 2010). According to characters listed here, *A. chrysogastra* (Tobias) undoubtedly belongs to the genus *Antrusa*, but not to *Aristelix*.

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